

# **Whitebark Pine Ecosystems**

## **Keystone Upper Subalpine Forest**

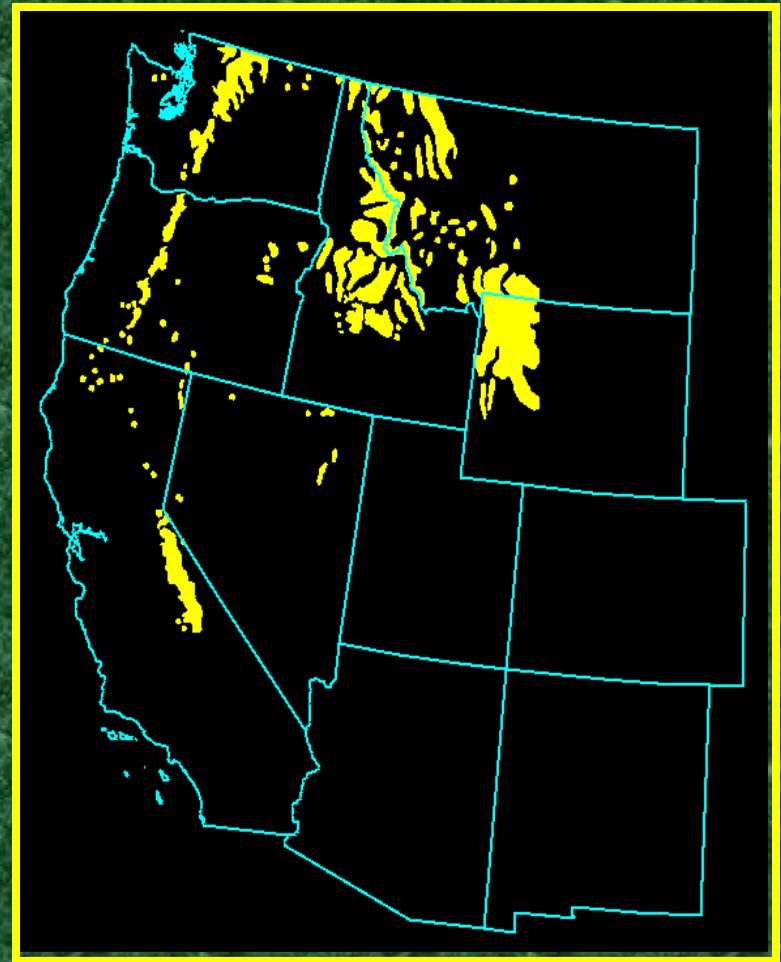
- **Delays snowmelt; regulates runoff**
- **Provides critical high - elevation habitat**
- **Unique plant communities add to landscape diversity**
- **Provides important food source**
- **>90% on public lands**



**Bishops Cap**  
**Glacier National Park**

# Geographical Range Whitebark Pine

- **Northern Rockies**
- **Pacific Northwest-  
Cascades**
- **Northern-Central  
Sierra Nevada**



# Whitebark Pine

- **Long lived (>1300 yr)**
- **Shade intolerant**
- **Drought tolerant**
- **Tolerates harsh conditions**
- **50+ years until cone bearing**
- **Good cone crops ~3-5 years**
- **Large, nutritious, fatty seed utilized by over 110 species**



Whitebark Pine Plus Tree  
Whitefish Mountain Resort

# Whitebark Pine

- Only “stone” pine in North America
- Cones do not open
- Large, wingless seed dependent on Clark’s nutcracker for dispersal
- Cones displayed upwards



# Whitebark Pine

## Regeneration Forces at Work



- Mutualistic relationship- bird is sole seed dispersal vector
- Sublingual pouch
- ❑ Disperses seeds up to 10 km and as far as 30 km
- ❑ Buries 1-15 seeds about 1-2 cm in caches on ground
- ❑ Can create 8,000 to 20,000 caches in one year
- ❑ Revisits 50-80 percent of caches
- ❑ Unclaimed seed= whitebark pine regeneration

**Clarks Nutcracker**

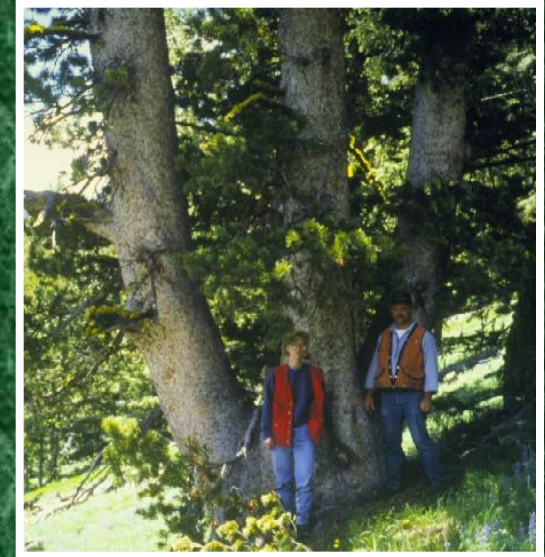
**Hornet Lookout North Fork Flathead**

# Whitebark Pine

## Nutcracker Legacy



**Unclaimed seed  
cache**



**Mature tree  
cluster**

**Sapling cluster**



# **Whitebark Pine Decline**

## **Major Causal Factors**



**Saint Mary Peak Trail  
Bitterroot National Forest**

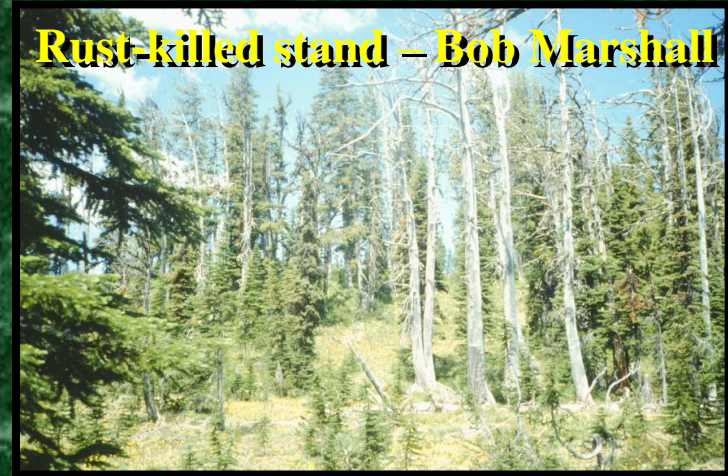
- **White pine blister rust**
- **Mountain pine beetle**
- **Fire exclusion policies**

# Whitebark Pine Decline

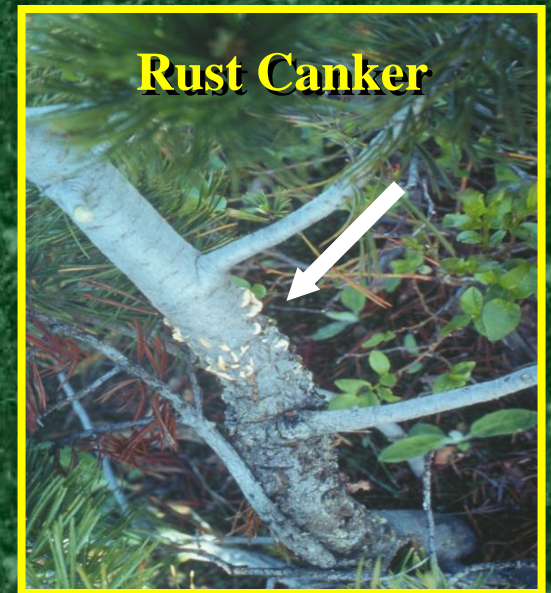
## White Pine Blister Rust

- **Non-native; introduced from Asia via Europe around 1900**
- **Attacks all 5-needle pines**
- **Kills cone-bearing branches first**
- **Natural rust resistance <5%**
- **>90% mortality from rust**

**Rust-killed stand – Bob Marshall**



**Rust Canker**

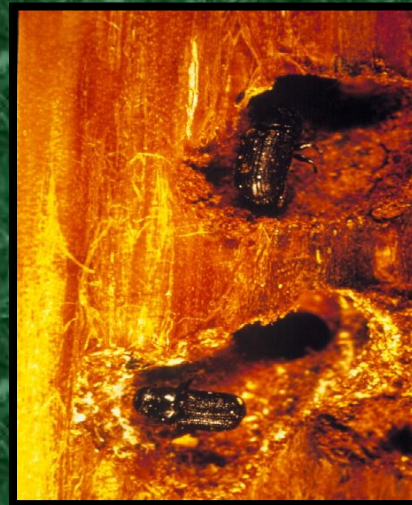




# Whitebark Pine Decline Mountain Pine Beetle



- 1930's beetle outbreak
- Recent beetle outbreaks
- Kill large, cone-bearing trees



**Mountain Pine  
Beetle**

**Beetle-killed whitebark pine stand**

# **Whitebark Pine Decline Fire Exclusion Policies**



**Smith Creek flaming whitebark pine**

- **Successful fire suppression program since about 1929**
- **Lack of fire advances succession and increases spruce/fir competitors**
- **Reduces regen. opportunities**



**“WBP Restoration Management”  
on the Flathead National Forest  
2014 WBP Cone Crop - Big Mtn.  
Photo: Sam Bailey**

# Restoration Treatments

## Planting



**Containerized seedling**



**Flathead NF- Skyland Fire**



**Micro-sited seedling**

## Typical WBP Planting Site Skyland-Hungry Horse R.D.

- Good Accessibility (planting/future monitoring)
- Excellent microsites for added protection
- Productive soils/vaccinium scoparium
- Previous/current evidence WBP (Mycorrhizal fungi-VASC)
- Burned areas (Skyland-Challenge Fires min. veg. response and competition)



## Typical WBP Planting Site Condon Mtn.-Swan Lake R.D.

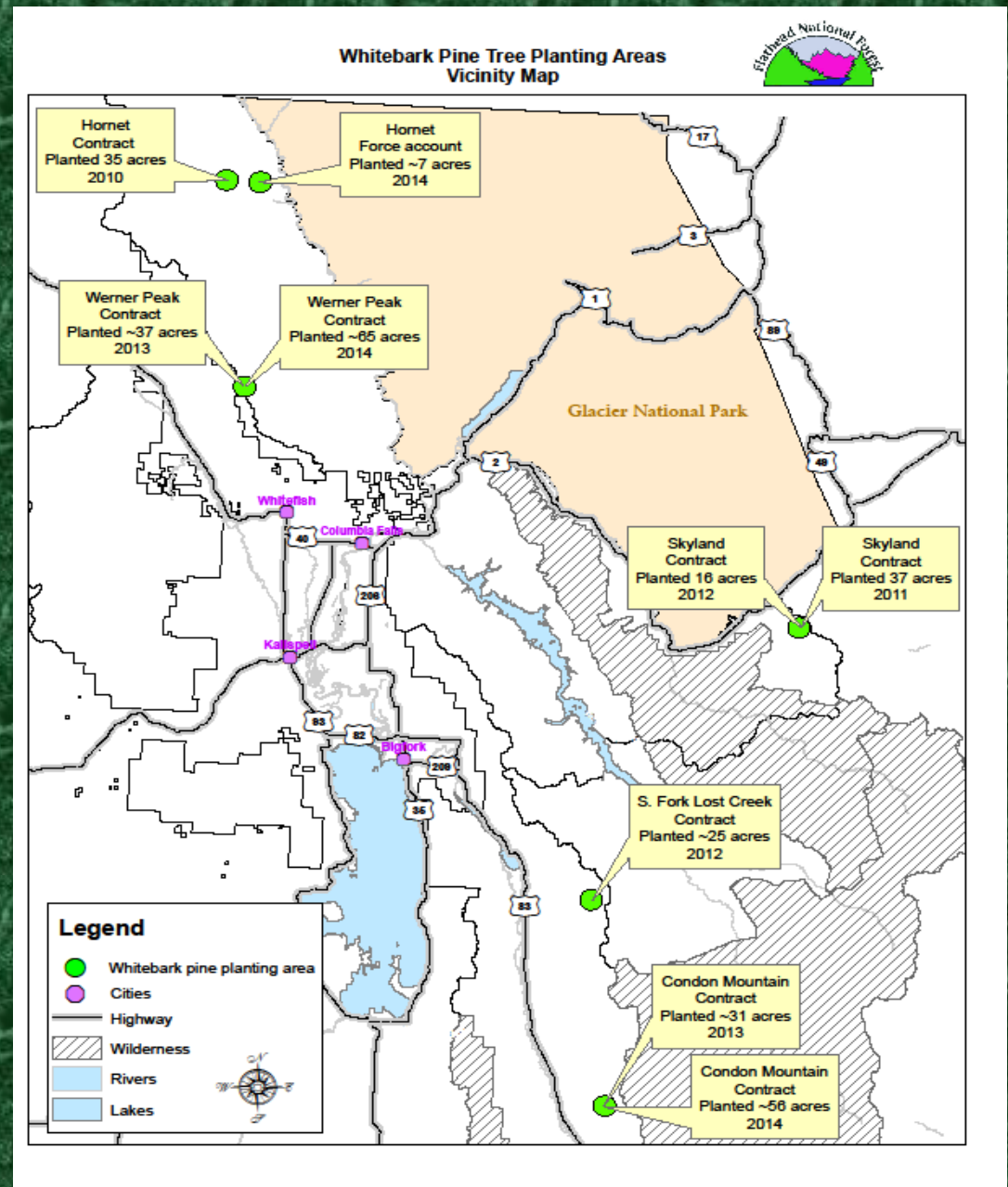
Microsites as well as planting spot locations heavily emphasized



**Photos: Aaron Martin**

# Flathead National Forest WBP Restoration Planting

- WBP planting sites across the Flathead National Forest from 2010-2016  
96 acres (2016)  
519 acres (2010-2016)
- Majority of acres planted administered through Forest-Wide contracts
- Additional sowing established for out-year spring planting  
2017 & 2018 (~165 acres)  
2019 (125 acres)



## WBP Plantation Survival 2010-2016

- First Year Survival:

|                         |          |                        |
|-------------------------|----------|------------------------|
| • 2015-Condon Mtn. Fire | 61 acres | 100%                   |
| • 2015-Skyland Fire     | 53 acres | 44% (extremely dry)    |
| • 2016-Elk Calf Mtn.    | 49 acres | 98%(row#1) 100%(row#2) |
| • 2016-Condon Mtn. Fire | 47 acres | 100%                   |

- Third Year Survival:

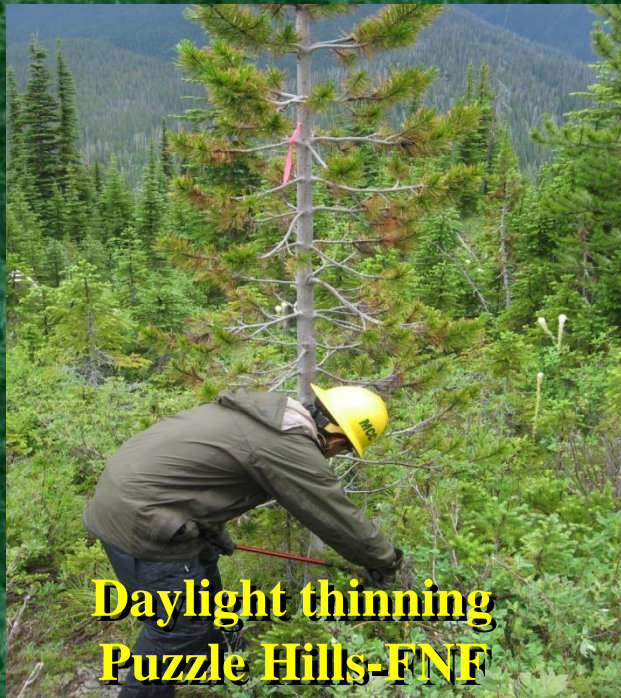
|                            |          |                           |
|----------------------------|----------|---------------------------|
| • 2012 -Hornet             | 35 acres | 93%                       |
| • 2013 -Skyland Fire       | 37 acres | 75%                       |
| • 2014 -Skyland Fire       | 16 acres | 86%(row #1) 71%(row #2)   |
| • 2014 -S. Fork Lost Creek | 25 acres | 71% (heavy veg. response) |
| • 2015-Werner Peak         | 37 acres | 89%                       |
| • 2015-Condon Mtn. Fire    | 31 acres | 94%                       |
| • 2016-Werner Peak         | 65 acres | 100%(row #1) 98%(row #2)  |
| • 2016-Condon Mtn. Fire    | 56 acres | 100%(row #1) 98%(row #2)  |
| • 2016-Hornet/Wedge Mtn.   | 7 acres  | 88%(Force Account Plant)  |



# Restoration Treatments

## Silvicultural Cuttings

- Nutcracker openings
- Species selective cuttings
- Thinning
- Slashing



**Beaver Ridge slash burn**

# Restoration Treatments

## Prescribed Fire

- **Underburns**
- **Stand-replacement burns**
- **Mixed severity burns**
- **Slash burns**



# Plus Tree Protection Methods- MPB Carbaryl, Verbenone Pouches & Splat



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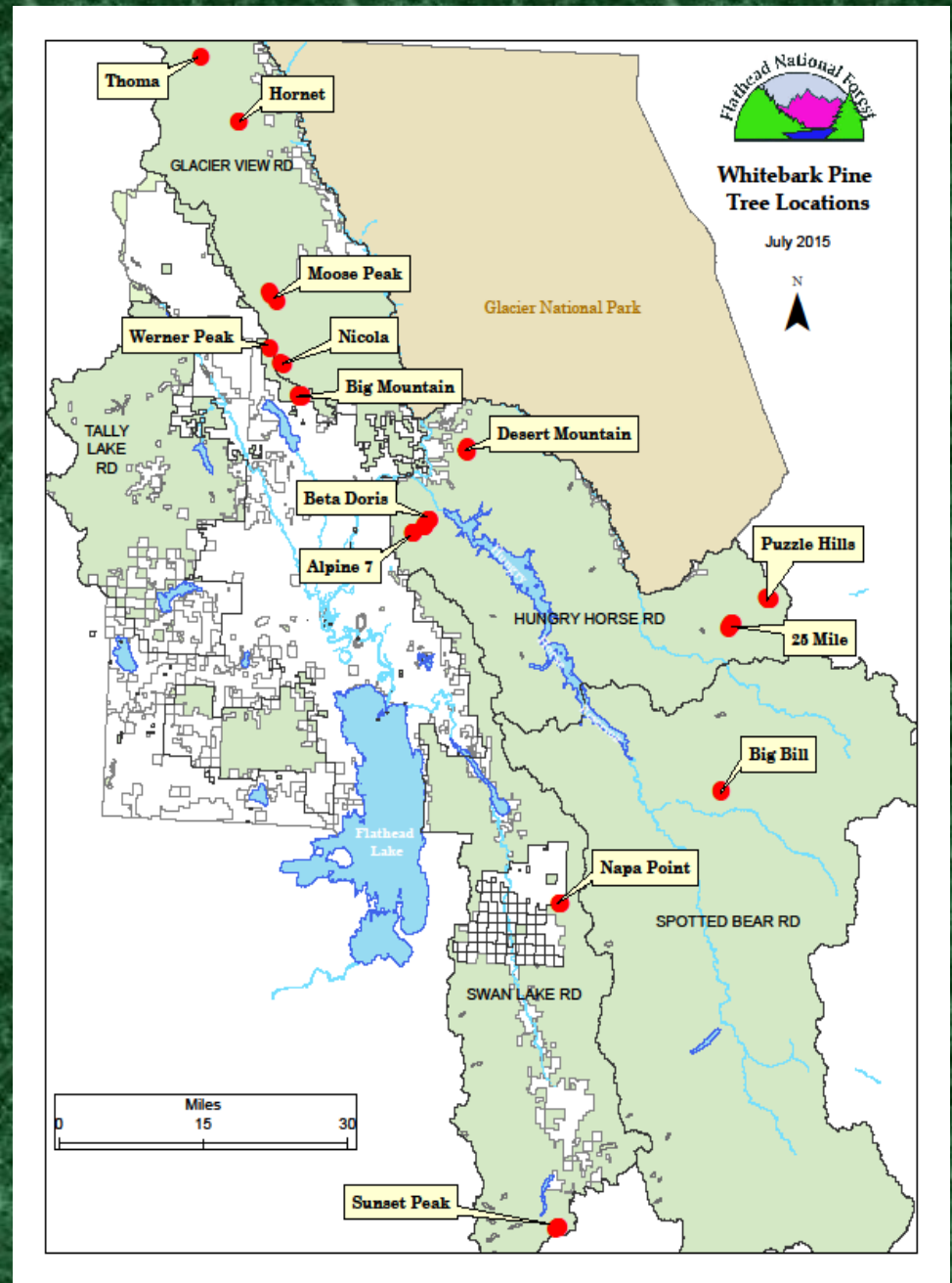
# Rust Resistance Breeding Program

- Identify trees w/phenotypic resistance-  
Seven on Big Mountain
- Collect seeds and grow out seedlings
- Expose seedlings to rust spores
- Plant seedlings and  
monitor for 5 years
- Collect scion for grafting
- Plant grafts in orchard



## Flathead National Forest WBP Plus Tree locations 2000-2016

- 63 trees identified through 2015
- 6 trees lost to Robert Fire 2003
- 3 trees lost to MPB attack
- 1 tree lost to blister rust
- 1 tree lost to unknown causes
- 3 additional plus trees located and identified in 2015 (Werner Peak & Thoma)
- Currently 52 trees total survive on 14 sites across the Flathead Forest



# Collect Seed- Climbing & Caging



## Flathead WBP Cone Caging & Collection

Utilize Both FS and Contract Certified Climbers





# Tree Climbing Cooperative Efforts Flathead National Forest & Glacier National Park



**Photos: Paul Jorgenson**

# Tree Climbing Cooperative Efforts Flathead National Forest & Glacier National Park



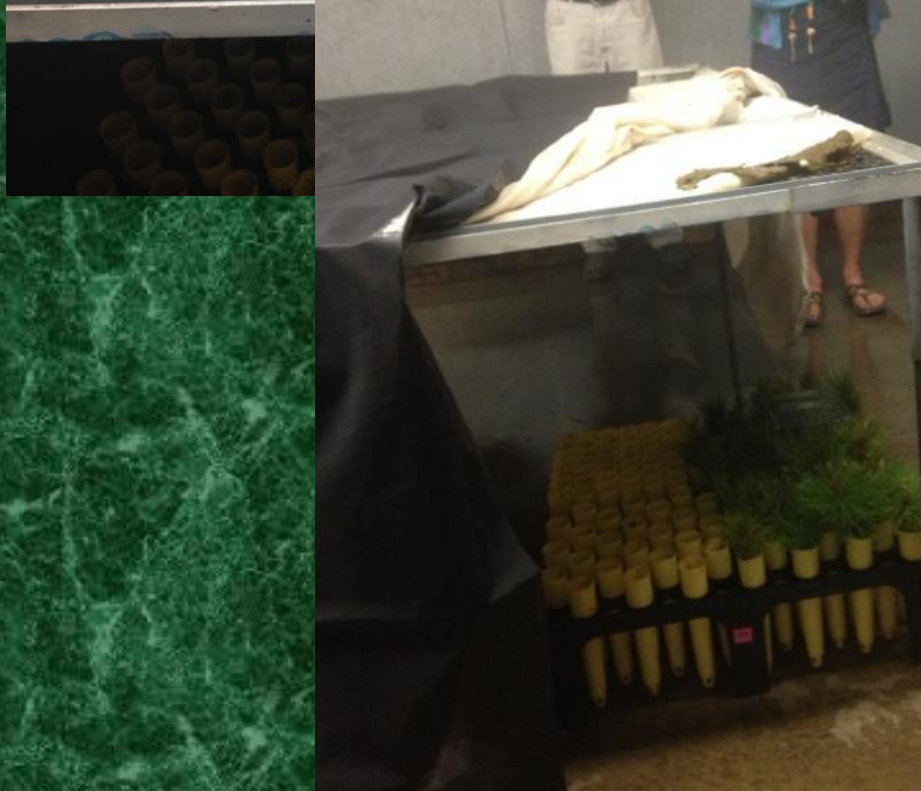
**Photos: Rebecca Lawrence**

# Expose Seedlings to Rust- Aeciospore Collections



Aeciospore Collections  
Whitefish Mountain Resort  
Ben Donner-FNF

# Seedling Innoculation



# Rust Screening Beds



## WBP Pollen Collections

Multiple locations collected annually dependent on year



Pollen Collections  
Whitefish Mountain Resort  
Rick Yates-FNF

# Scion Grafting



Puzzle Hills WBP Scion  
Photo: Dave Foushee  
CDA Nursery



Conelet on 1-year old graft at Plains whitebark seed orchard- Hope for the future!!!!

## Other Noteworthy Flathead WBP Projects:

\*\*Completed in 2014 collection of WBP plot locational information working with Steve Brown (R1 Geospatial Group) & Ian Housman (USDA Remote Sensing Applications Center-RSAC).

Purpose of project was mapping out (ground truthing) where WBP exists or coexist within the different alpine cover types on the Forest. This information was sampled in 2012-2014 looking at known areas of surviving intact WBP on the Forest, as well as other areas that may have had WBP or none at all. Goal was realized last year with the Forest being able to access and use the modeling data displaying in greater detail and accuracy where WBP is present or absent across the Forest.

Continuing to develop a WBP restoration strategy for the Forest (WBP mapping project an instrumental part of this process).

\*\*Skyland Creek-Elk Calf Mountain Cycle 3 (Continental Divide – Hungry Horse Ranger District) local WBP test plantation site confirmed in 2014. Test site was prepped in (Fall 2015) and planted (Spring 2016). Plantation is ~8 acres in size established with seedlings that have been collected from seed lots in the immediate area since 2012, as well as seedlings collected from other Forests. First year survival measurement for planted seedlings data collection completed this week.

\*\*Hornet Mountain-Cycle 6 (North Fork Flathead-Glacier View Ranger District) local WBP test plantation site confirmed in 2016. Test site will be prepped in fall of 2018 or spring 2019. Installation and planting slated for 2020.



# Elk Calf Mtn. WBP Test Plantation Installation Spring 2016



# WBP Restoration Strategy Principles

- Promote Rust Resistance
- Conserve Genetic Diversity
- Save Seed Sources
- Employ Restoration Treatments



United States  
Department of  
Agriculture  
Forest Service  
Rocky Mountain  
Research Station  
General Technical  
Report RMRS-GTR-279  
June 2012



## A Range-Wide Restoration Strategy for Whitebark Pine (*Pinus albicaulis*)



**Force Account WBP  
Planting Crew  
Hornet-Wedge Mtn.  
June 2014**

**Questions???**

